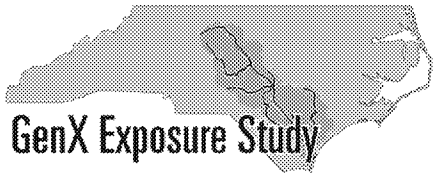
NC STATE UNIVERSITY

Center for
Human
Health and the
Environment



Virtual Fayetteville Community Meeting
June 20,2020

Welcome and thank you for joining us! A few housekeeping items:

Everyone will remain muted for the session. Please send questions through the Q&A box.

This meeting will be recorded and posted to our website: *GenXStudy.ncsu.edu*.

You can send any follow up questions or comments to *genx-exposure-study@ncsu.edu*.

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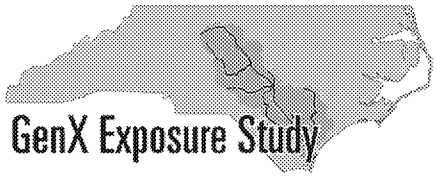


PFAS results for private wells sampled Feb 2019

Jane Hoppin, ScD, jahoppin@ncsu.edu
Nadine Kotlarz, PhD, nkotlar@ncsu.edu

GenX Exposure Study

The GenX Exposure Study is a research study

Funded by the National Institutes of Health (NIH)

Designed to answer community questions about GenX exposure:

- Is GenX detectable in my body? My house?
- What predicts GenX in my body?
- Are there health effects associated with GenX?

More than just GenX

GenX is part of a family of chemicals called:

- Per- and poly-fluoroalkyl substances (PFAS)

GenX is uniquely associated with the Chemours plant

- Released to both air and water

Other byproducts of Chemours include

- PFMOAA, Nafion byproduct 2 and others

Also measuring legacy PFAS

GOAL: to get a picture of the overall PFAS exposure

GenX Exposure Study: What did we do?

Enrolled 153 Fayetteville participants in February 2019

- Wells previously sampled for GenX

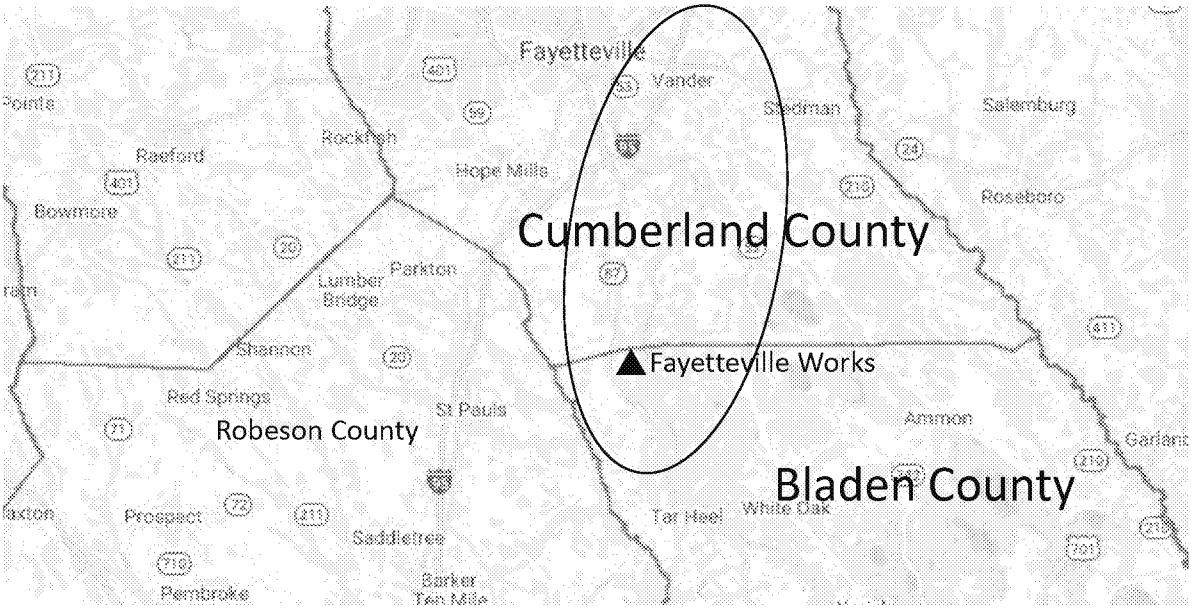
Collected well and tap water to analyze for PFAS

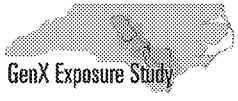
Collected blood and urine samples for PFAS

Analyzed blood for clinical measures

Working from a list of previously sampled homes provided to us by DEQ

“Fayetteville cohort”





I’m not going to comment on where individual wells are

Fayetteville Participation – Feb 2019

153 people enrolled

- 137 adults
- 16 children

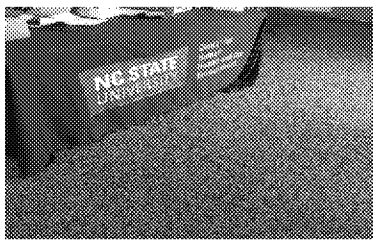
85 households

- 14 Bladen County
- 71 Cumberland County

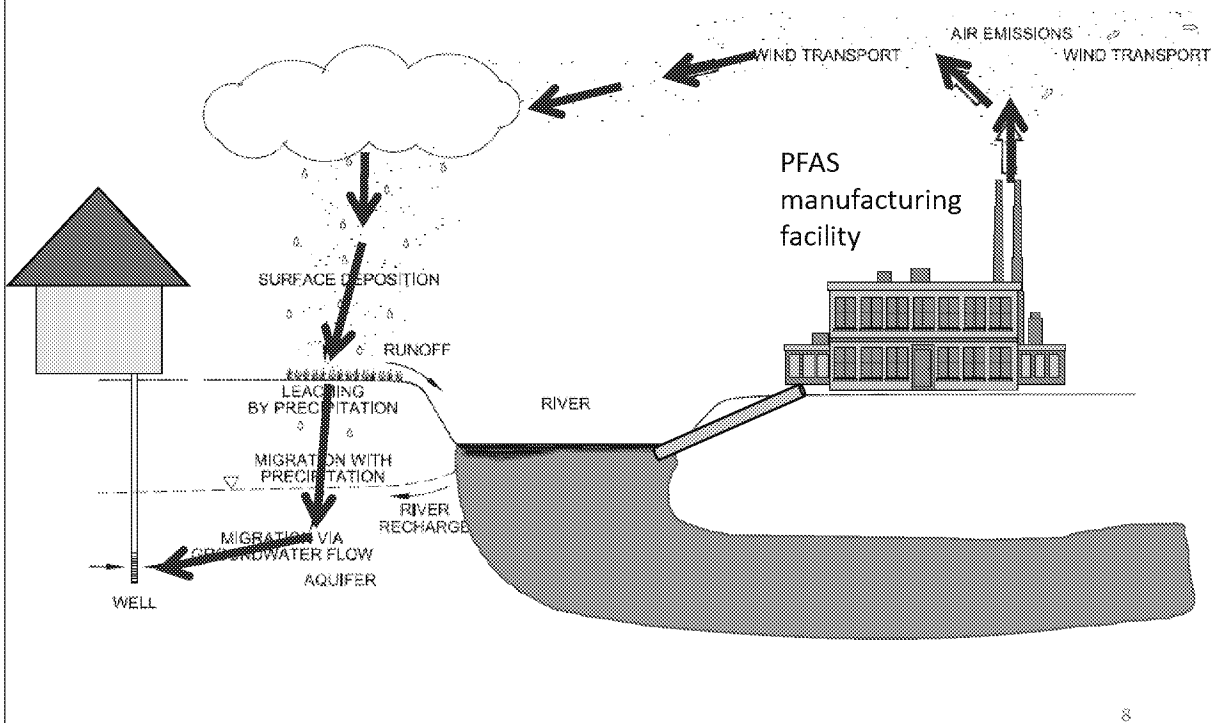
Up to 5 people/household

Lived at current address

- 17% <5 years
- 44% 20+ years



How did wells get contaminated?



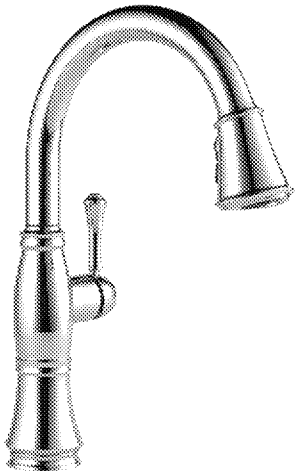
Modified from Davis et al. *Chemosphere* 2007, 67, 2011–2019

Several wells surrounding Fayetteville Works have been contaminated by air emissions from the facility
The way this happens is
Air coming from Fayetteville Works contained several PFAS
Those PFAS were transported by wind to the surrounding areas where people live
PFAS were deposited onto the soil
PFAS moved downward when it rained into the groundwater

Well and tap water sampling

Well sample (84 wells)

Kitchen tap sample (82 taps)



We collected water samples from 84 wells and in 82 of the 84 homes we were able to get a water sample from the kitchen tap as well

Why collect WELL water samples?

1) Understand sources of PFAS exposure

2) Look for other PFAS besides GenX

We collected well samples as part of our study because we want to understand how people are exposed to PFAS from Chemours

At the time that we did our sample collection most of the data from private wells was for GenX only
We wanted to analyze wells for several other PFAS, not just GenX

Why collect TAP water samples?

Get information about what people are exposed to

GenX Exposure Study

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We also collected tap water samples because what comes out of the tap is what people are actually exposed to

Timeline

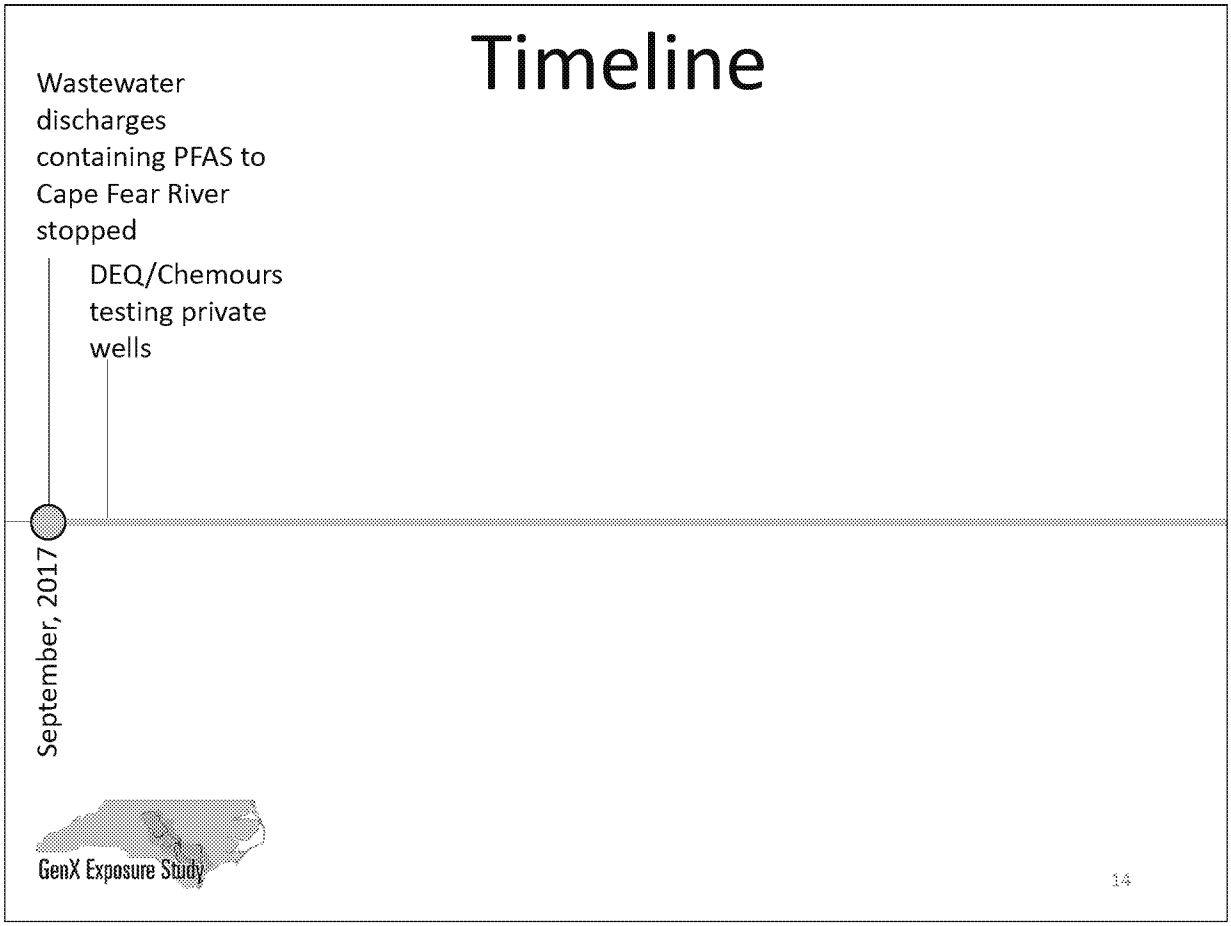
Timeline

Wastewater discharges containing PFAS to Cape Fear River stopped

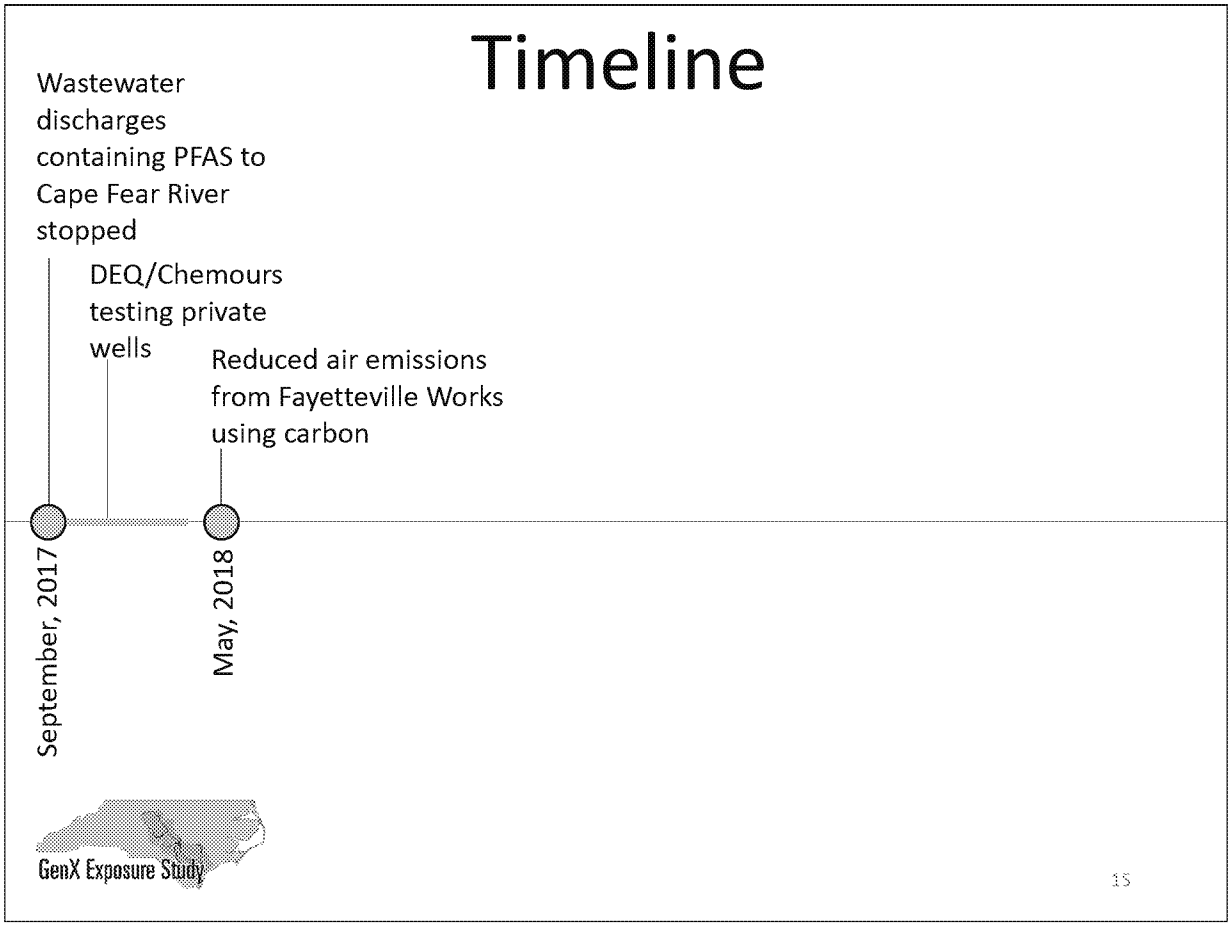
September, 2017

13

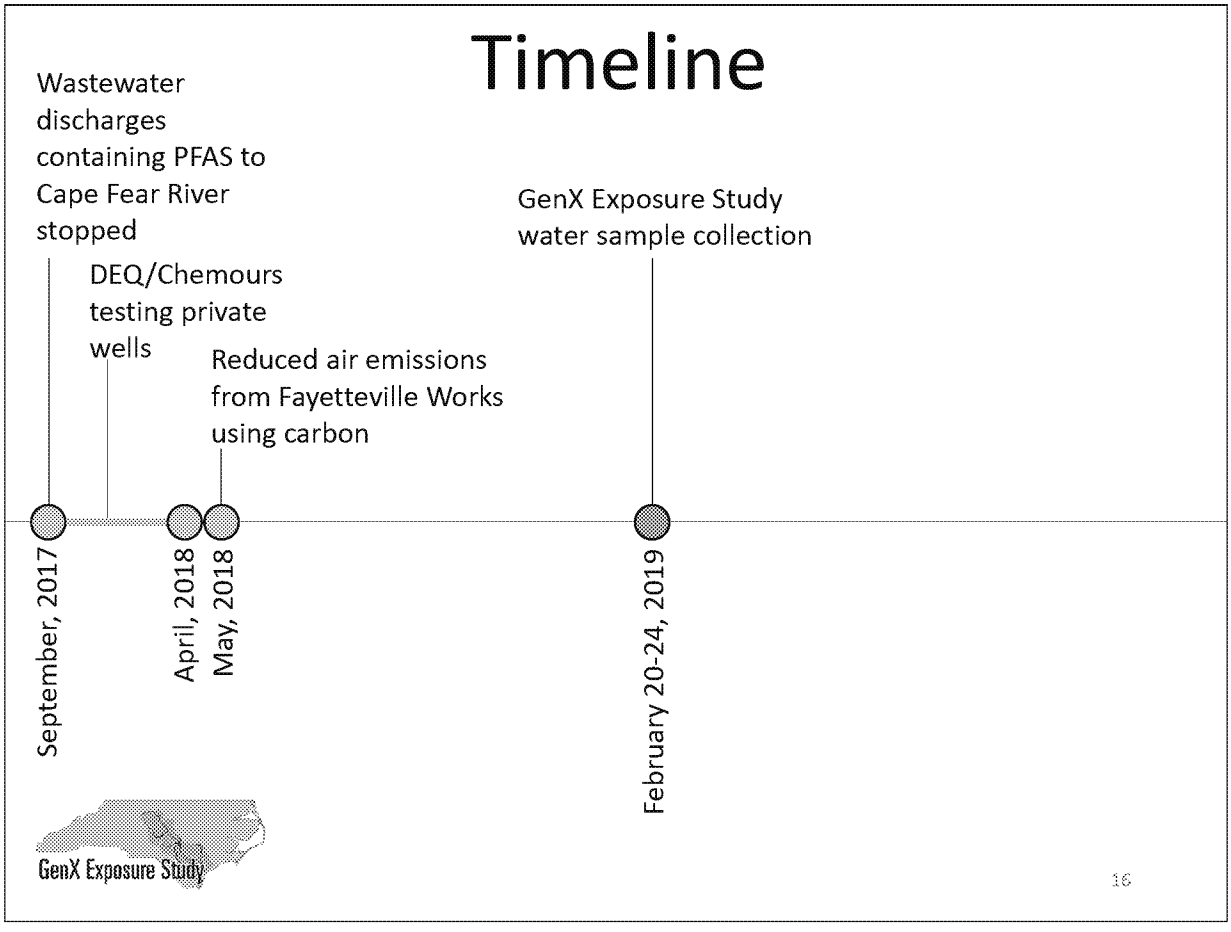
The first step that Chemours took to address the PFAS contamination was to stop discharging wastewater containing PFAS to the Cape Fear River in Sept 2017



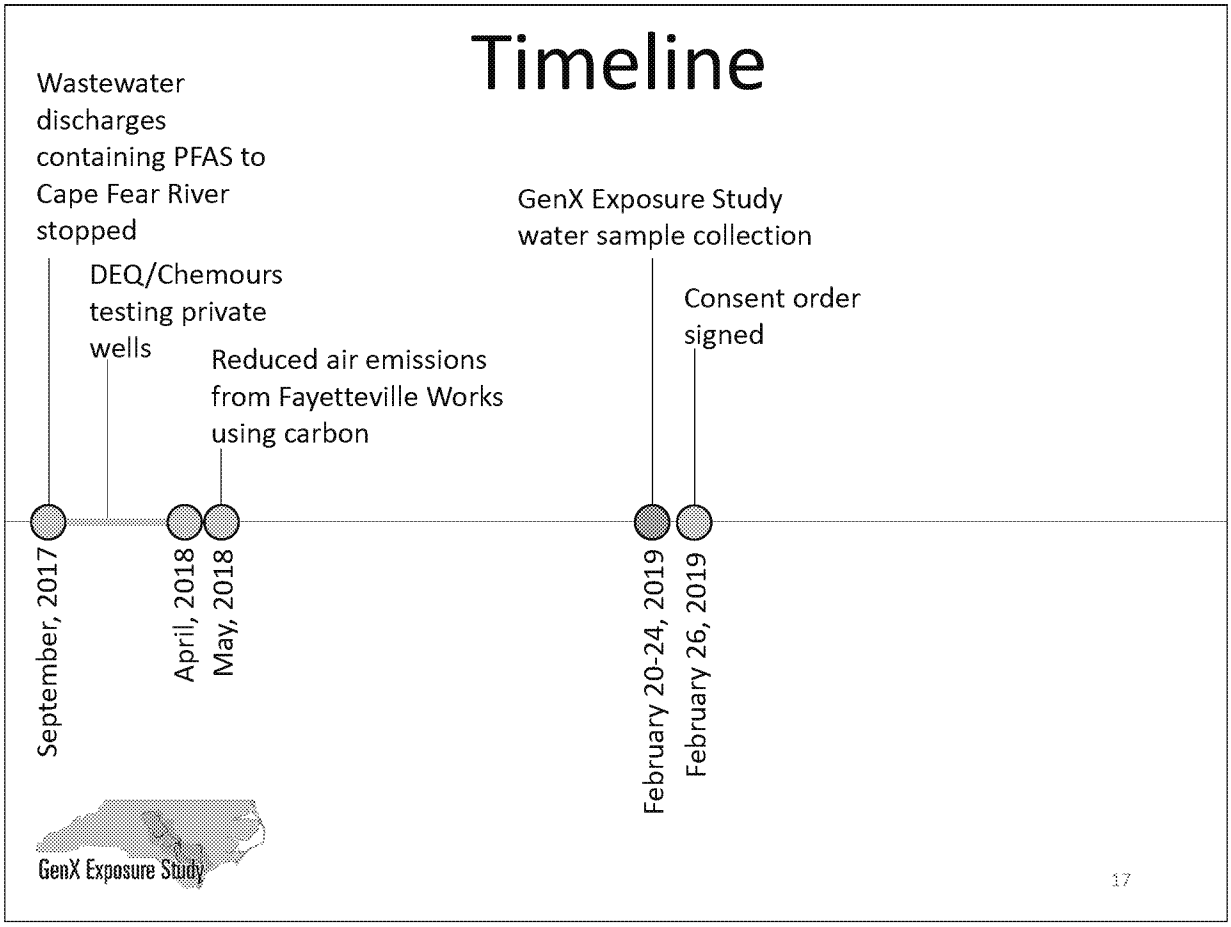
DEQ and Chemours collected samples from several private wells near Fayetteville Works and analyzed the samples mostly for GenX



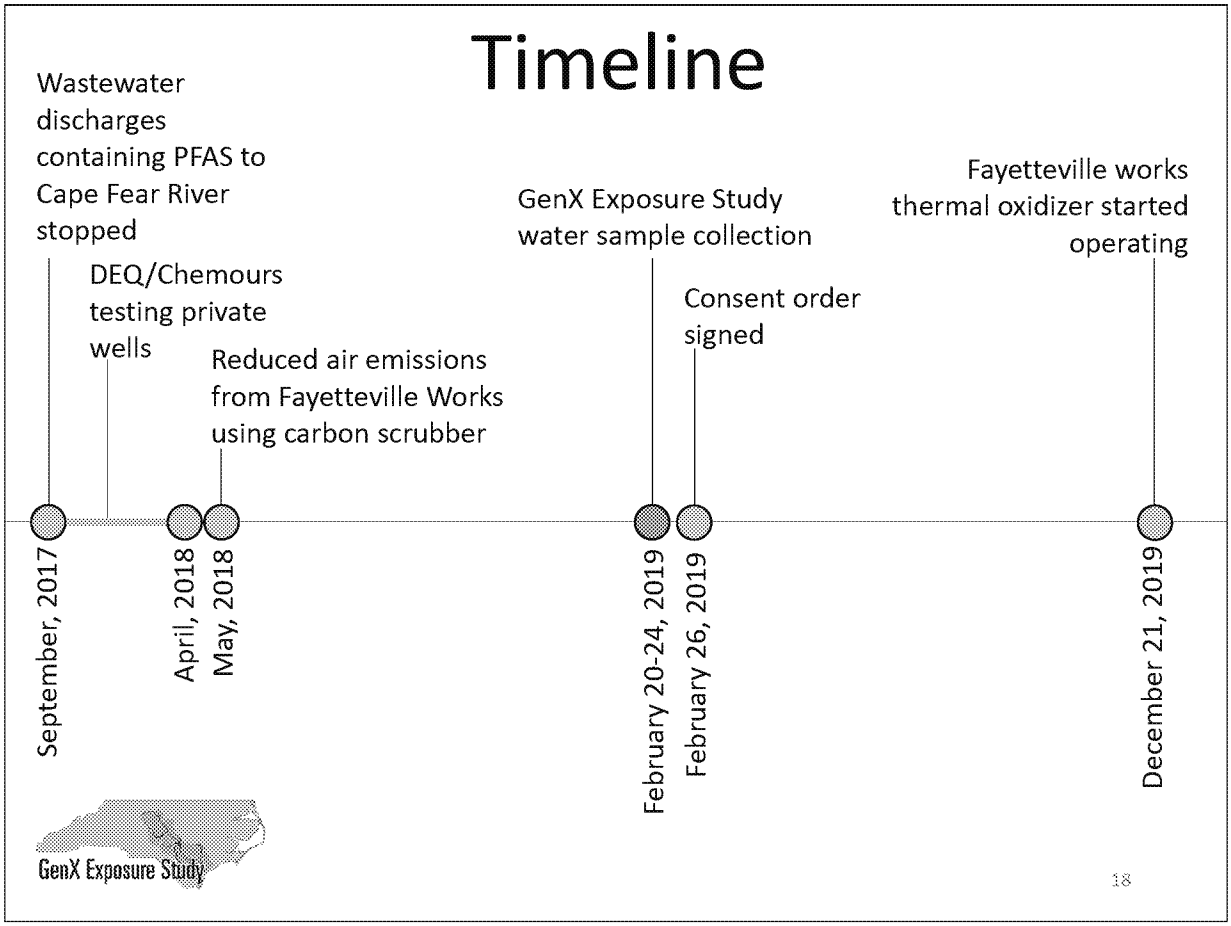
In May 2018, Chemours began to reduce its air emissions from Fayetteville Works using Carbon



Nine months later, we were in the field collecting water samples from our study participants' wells
We sampled 84 wells in four days



Shortly afterward, the Chemours consent order was signed which required Chemours to take more action to address the PFAS contamination

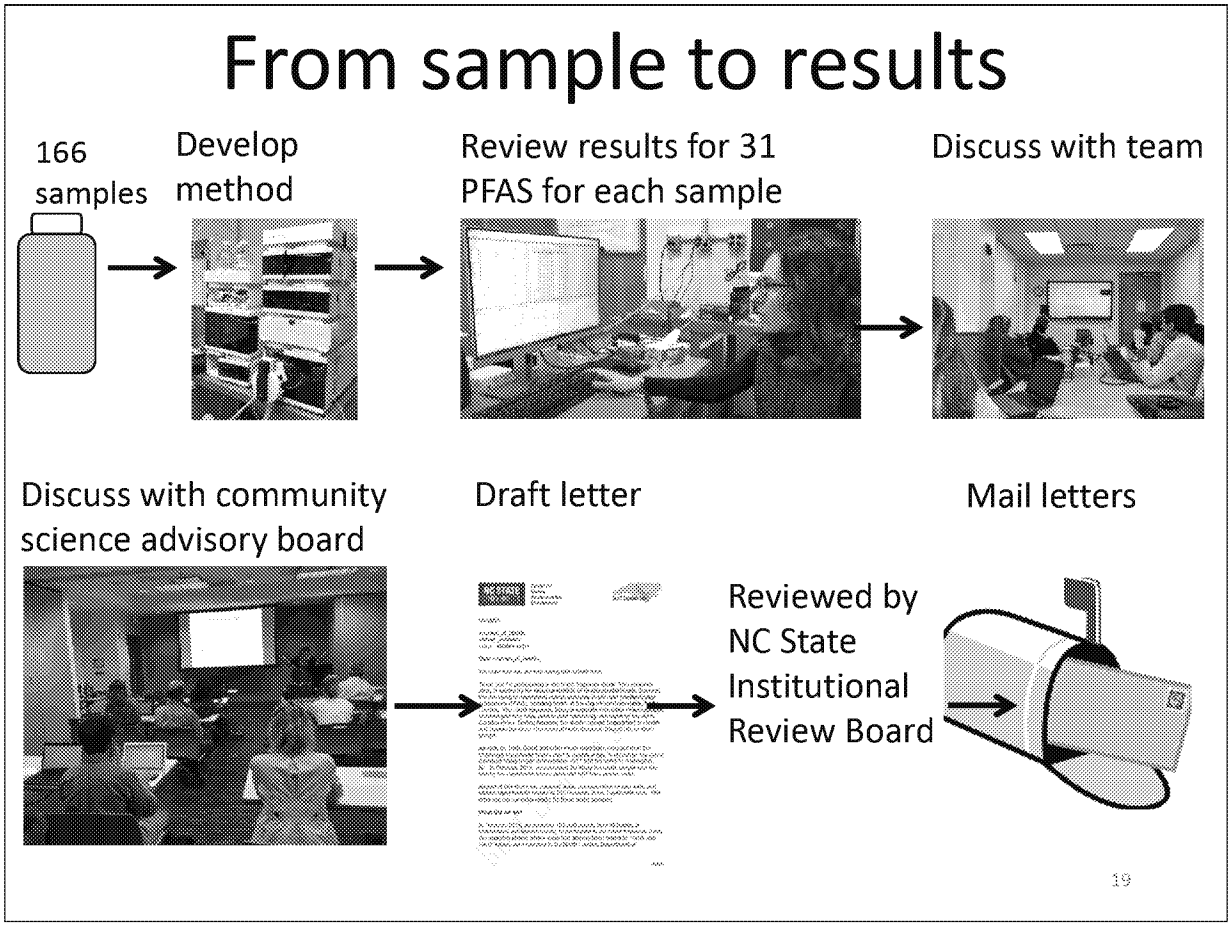


In December 2018, Chemours took an additional step to reduce air pollution by installing a thermal oxidizer

By February of 2019, Chemours had taken some initial steps to reduce PFAS emissions to the air. Since the time of our sample collection, Chemours has installed additional air pollution control equipment.

This means that there were ongoing air emissions during the time of our sample collection

Put a box around things. Something that sets off each of the pieces.



This diagram shows you the process our team goes through from having a sample to being able to report results

Summary of PFAS water results

1. Wide range of GenX concentrations in wells
2. Found 10 other PFAS in more than half of wells
3. Legacy PFAS: PFBA and PFPeA detected frequently; PFOA and PFOS detected in some wells
4. Wells with higher GenX tended to have higher levels of the other PFAS
5. Overall, treated taps had lower levels of GenX than untreated taps

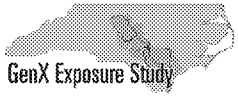
I'm going to start by summarizing our results and then we will work through what we did, and each one of the results in more detail

Animate and step through each one

Looked for 31 PFAS in water

Unique to Fayetteville Works

1. GenX
2. PFMOAA
3. PEPA
4. PMPA
5. PFO2HxA
6. PFO3OA
7. NVHOS
8. PFO4DA
9. Hydro-EVE
10. PFO5DoA
11. Nafion byproduct 1
12. Nafion byproduct 2
13. Nafion byproduct 4



We tested for 31 PFAS, including GenX and Nafion byproduct 2 in each water sample
Those PFAS were chosen based on our current knowledge of PFAS contamination in the area (PFAS originating from Fayetteville Works as well as other sources)
Our analytical method can detect PFAS at nanogram-per-liter levels
ng/L is the same as part-per-trillion
While these are low levels, we are confident in our ability to test for the presence of PFAS in water at very low levels
A complete list of chemicals can be found on our website

Looked for 31 PFAS in water

Unique to Fayetteville Works

1. GenX
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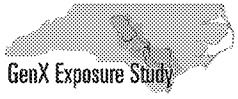

"Legacy" PFAS

1. PFOA
2. PFOS
3. PFBA
4. PFBS
5. PFPeA
6. PFPeS
7. PFHxA
8. PFHxS
9. PFHpA
10. PFHpS
11. PFNA
12. PFDA
13. 4:2 FTS
14. 6:2 FTS
15. 8:2 FTS
16. FBSA
17. FOSA
18. FHxSA

22

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Those PFAS were chosen based on our current knowledge of PFAS contamination in the area (PFAS originating from Fayetteville Works as well as other sources)
Our analytical method can detect PFAS at nanogram-per-liter levels
ng/L is the same as part-per-trillion

We also tested for several legacy PFAS which have been used historically throughout NC and the US

Focus on results for 13 PFAS

Unique to Fayetteville Works

1. GenX
2. PFMOAA
3. PEPA
4. PMPA
5. PFO2HxA
6. PFO3OA
7. NVHOS

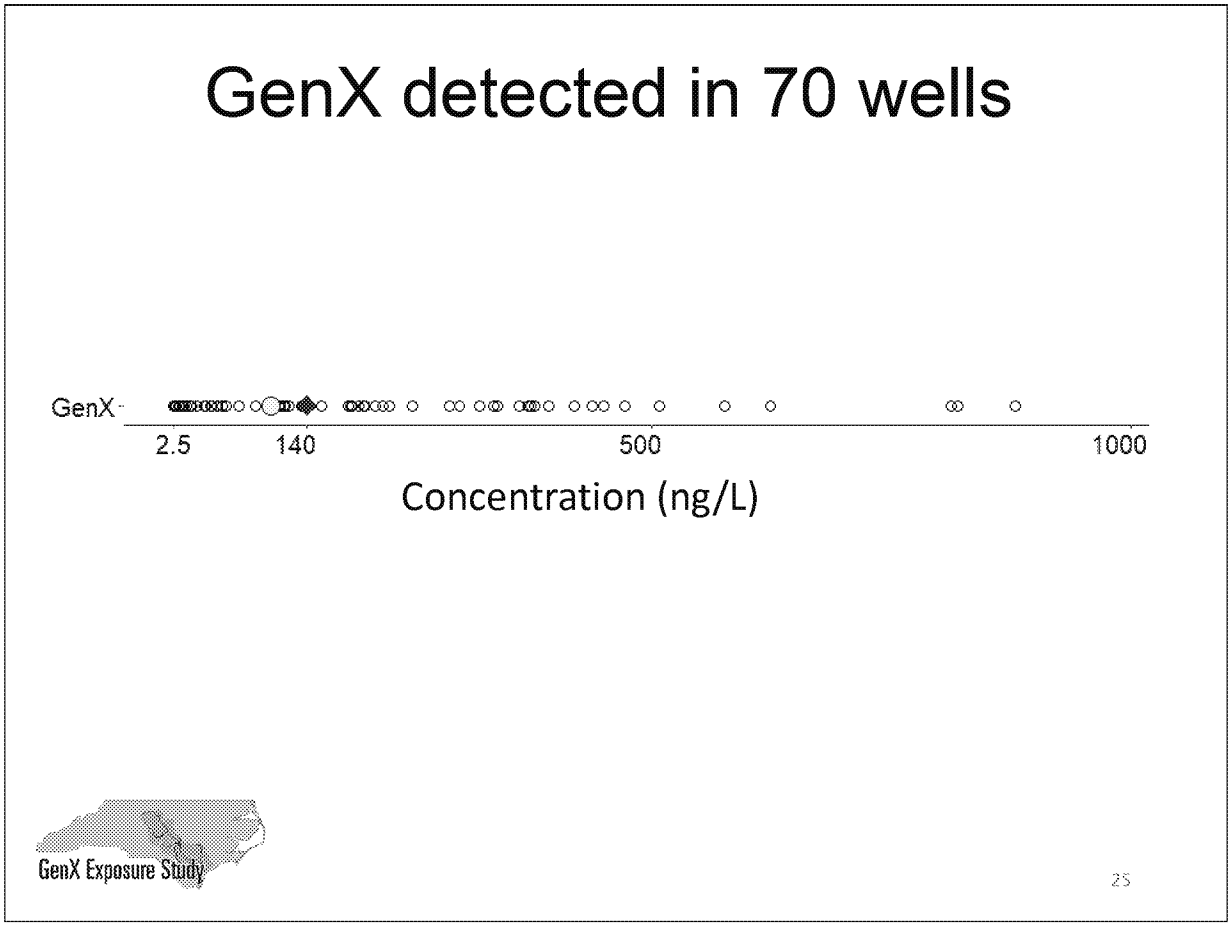
12. Nafion byproduct 2
13. Nafion byproduct 4

"Legacy" PFAS

1. PFOA
2. PFOS
3. PFBA
5. PFPeA

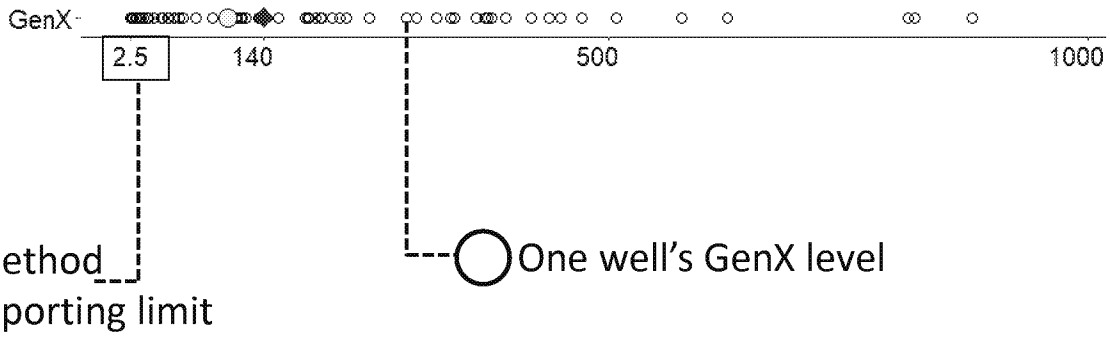
I'm going to focus on results for 13 PFAS (9 Chemours PFAS and 4 legacy PFAS)
The other PFAS I am not focusing on were either not detected or rarely detected in wells

What did we find in wells?



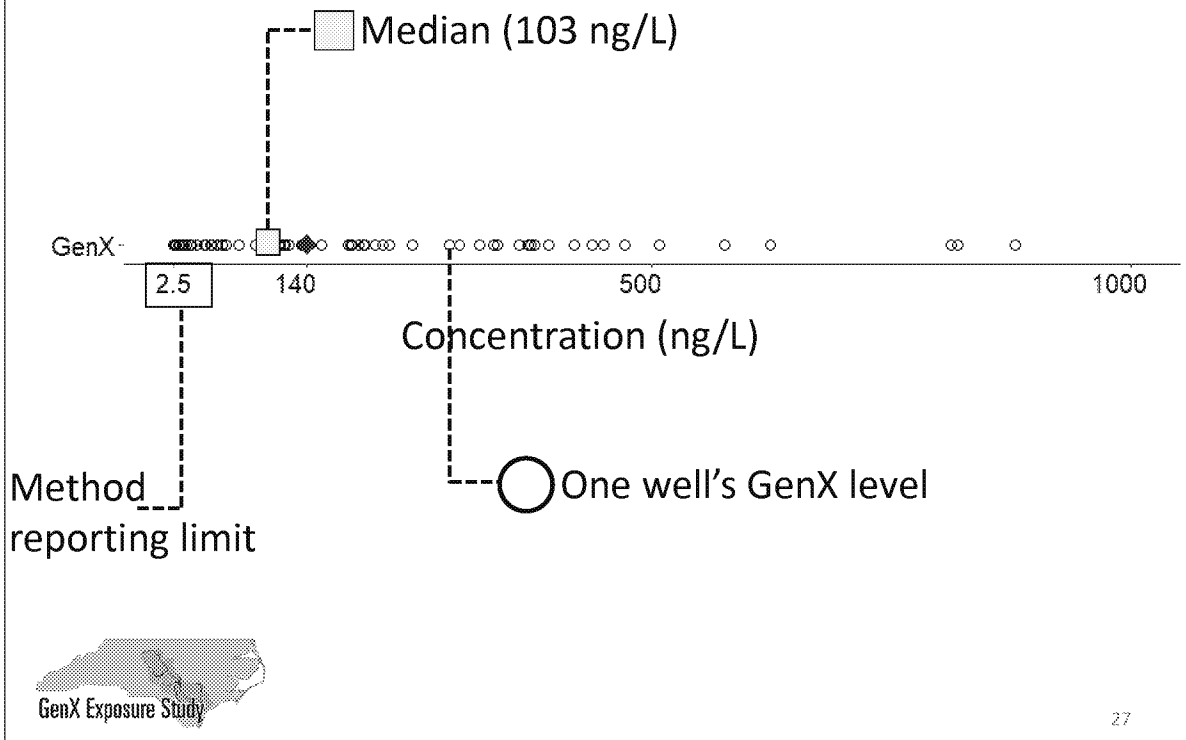
This is a stripchart
This line shows concentration in ng/L which is the same thin as parts per trillion

GenX detected in 70 wells



GenX Exposure Study

GenX detected in 70 wells



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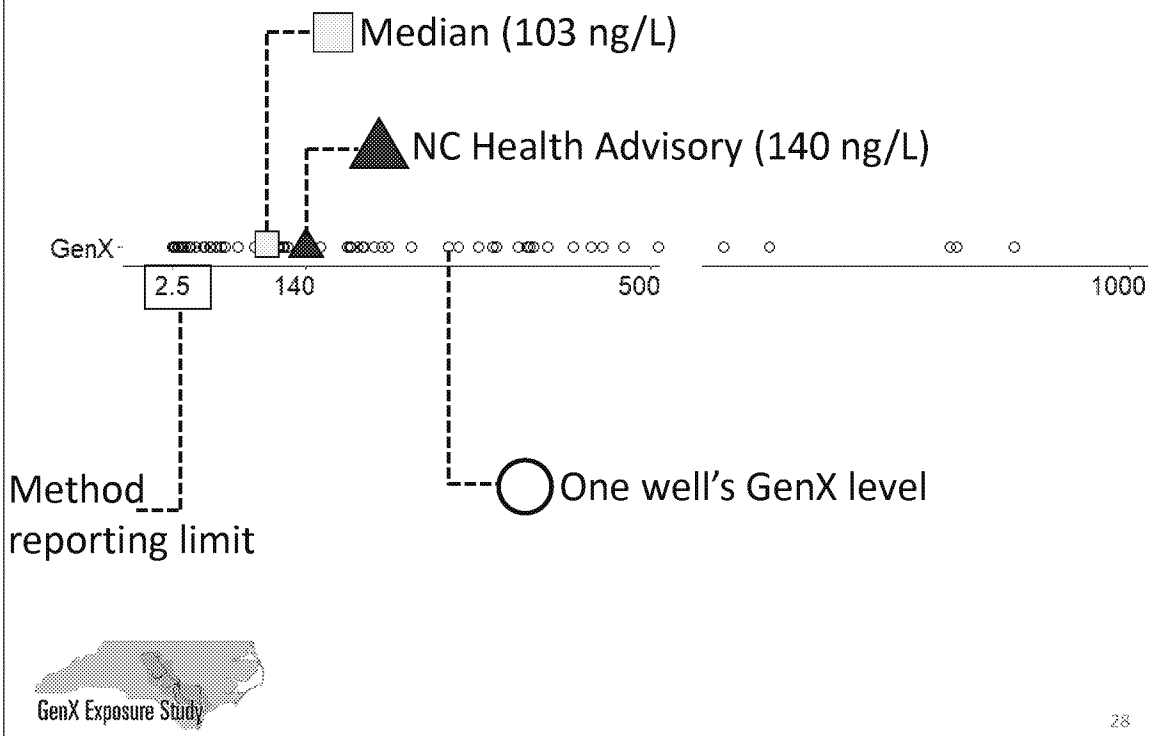


28

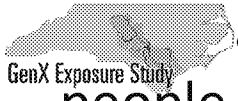
Drinking water health advisory

A concentration in drinking water (ng/L)

- NC 140 ng/L GenX
- US EPA 70 ng/L PFOA
- US EPA 70 ng/L PFOS

Chosen based on scientific research

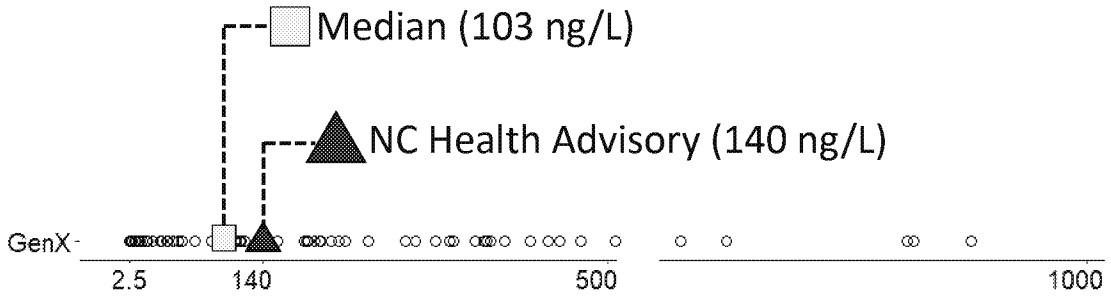
At this level or lower, no human health are expected in the most sensitive people over a lifetime of exposure



A health advisory is a concentration in drinking water
Chosen based on scientific research
The GenX health advisory was chosen by NC Department of Health and Human Services

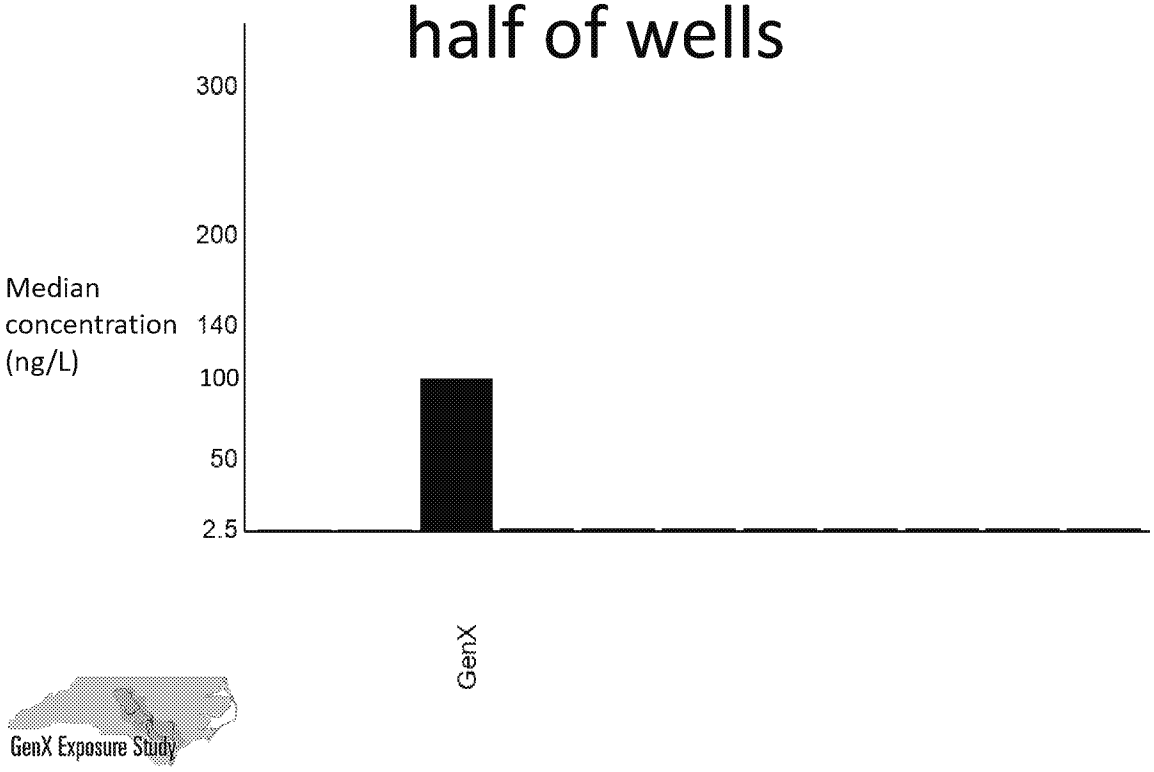
See the 140
70

33 wells had GenX higher than 140 ng/L



GenX Exposure Study

10 other PFAS detected in more than half of wells



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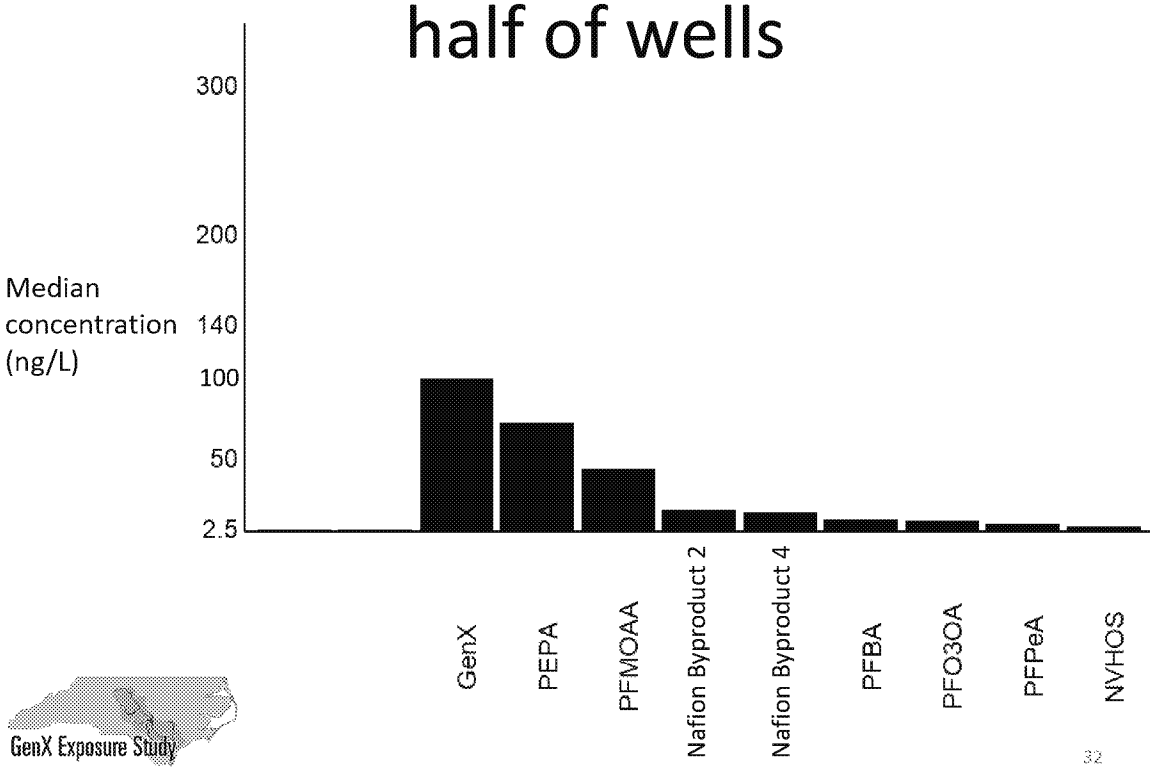

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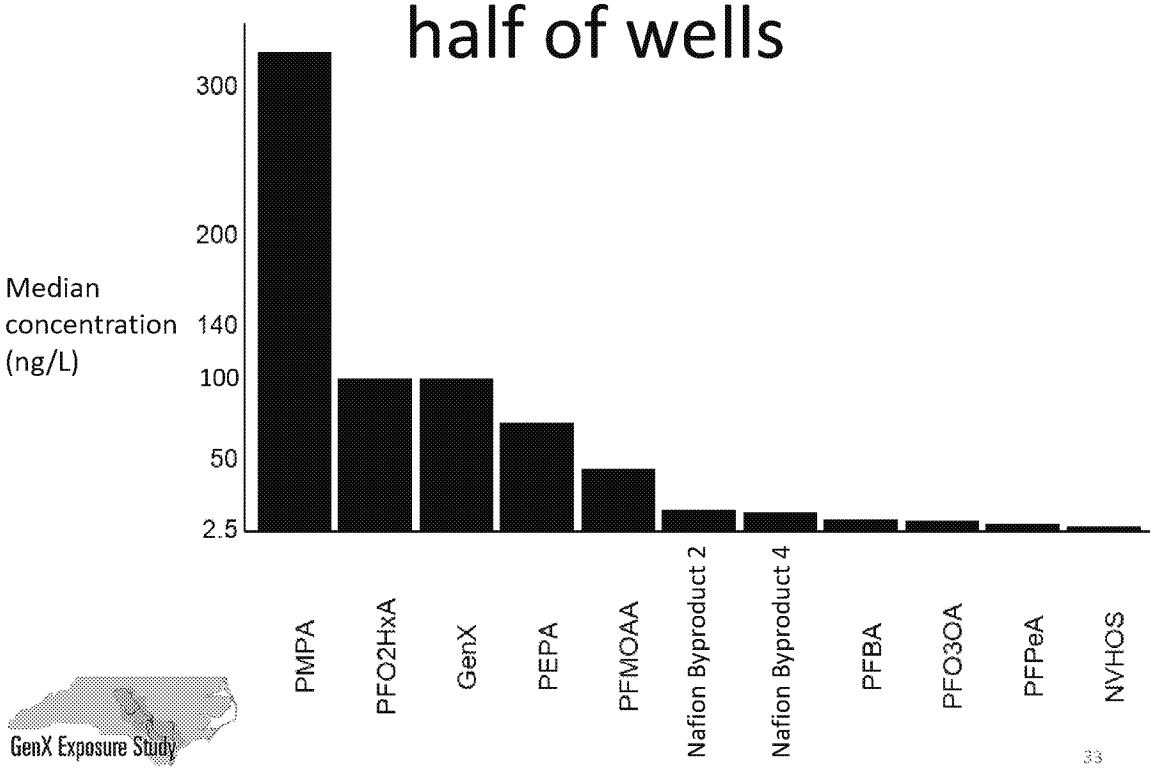
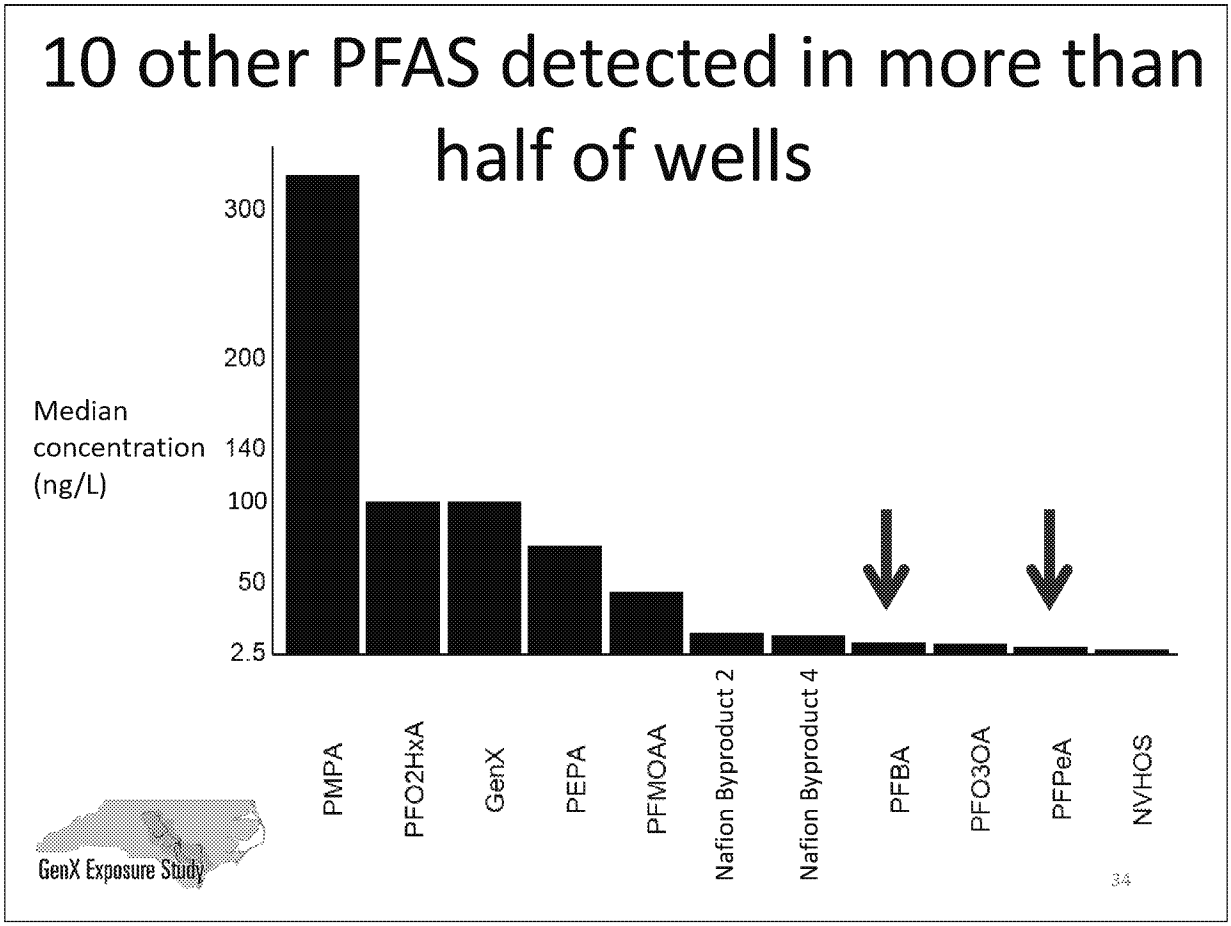
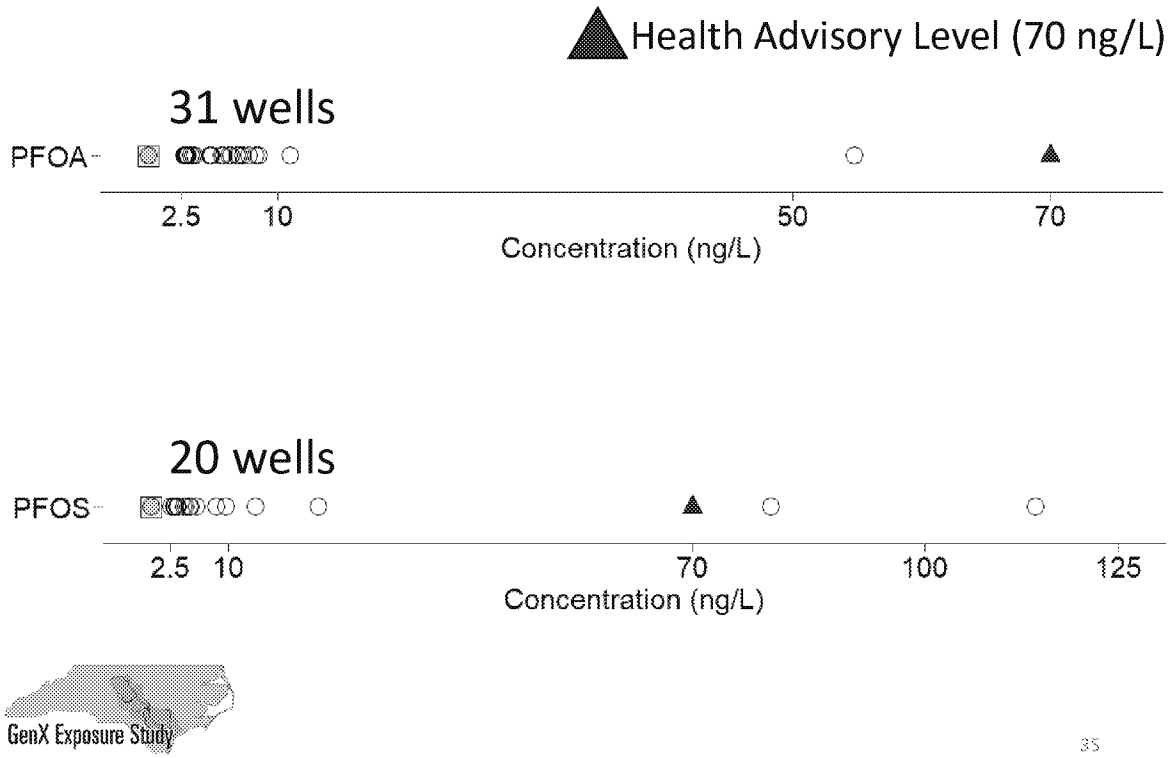




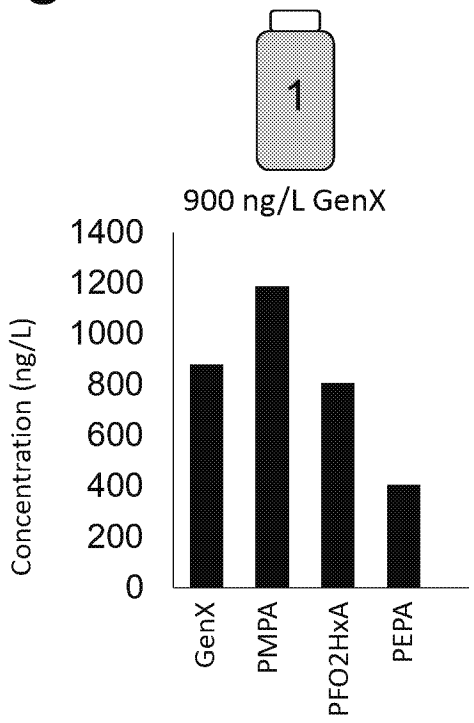
Apart from GenX, none of the PFAS shown here have health advisories meaning we do not know what are safe levels for drinking

Detected PFOA and PFOS in some wells



35

Samples with higher GenX tended to have higher levels of other PFAS



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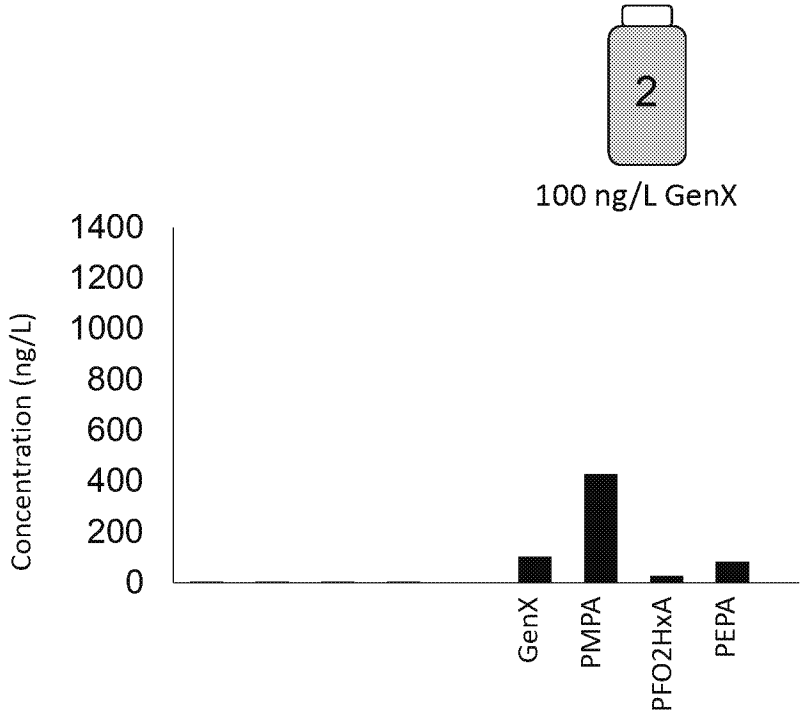
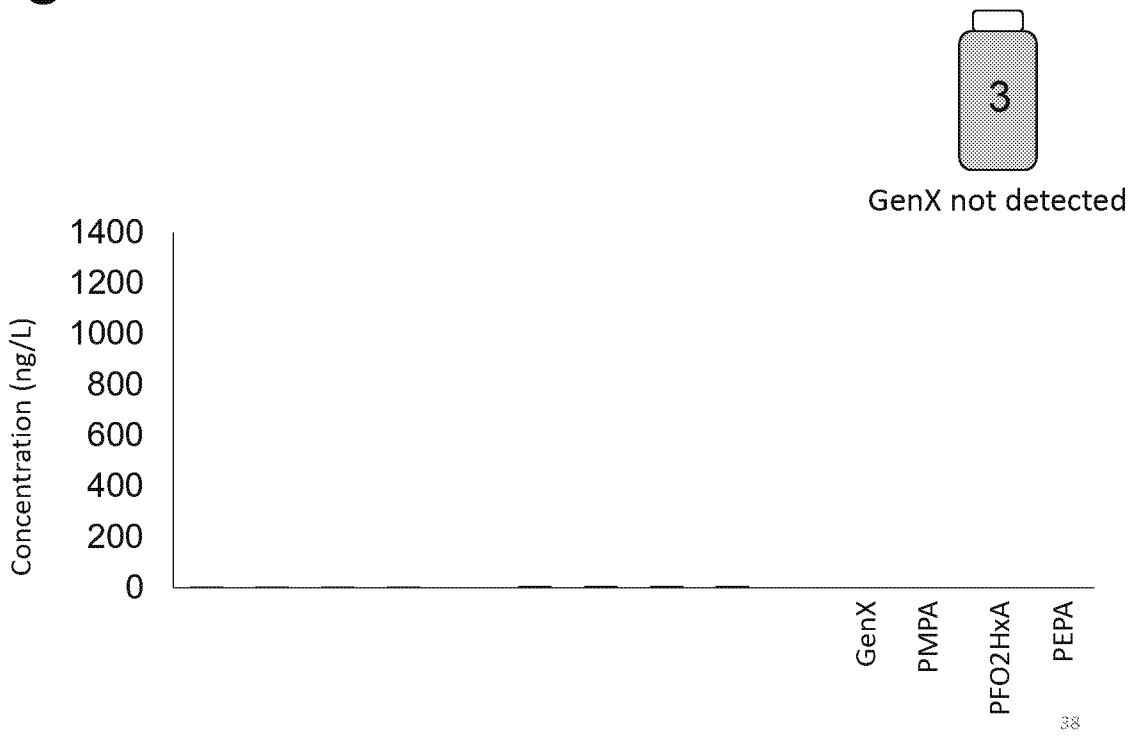


37

Samples with higher GenX tended to have higher levels of other PFAS



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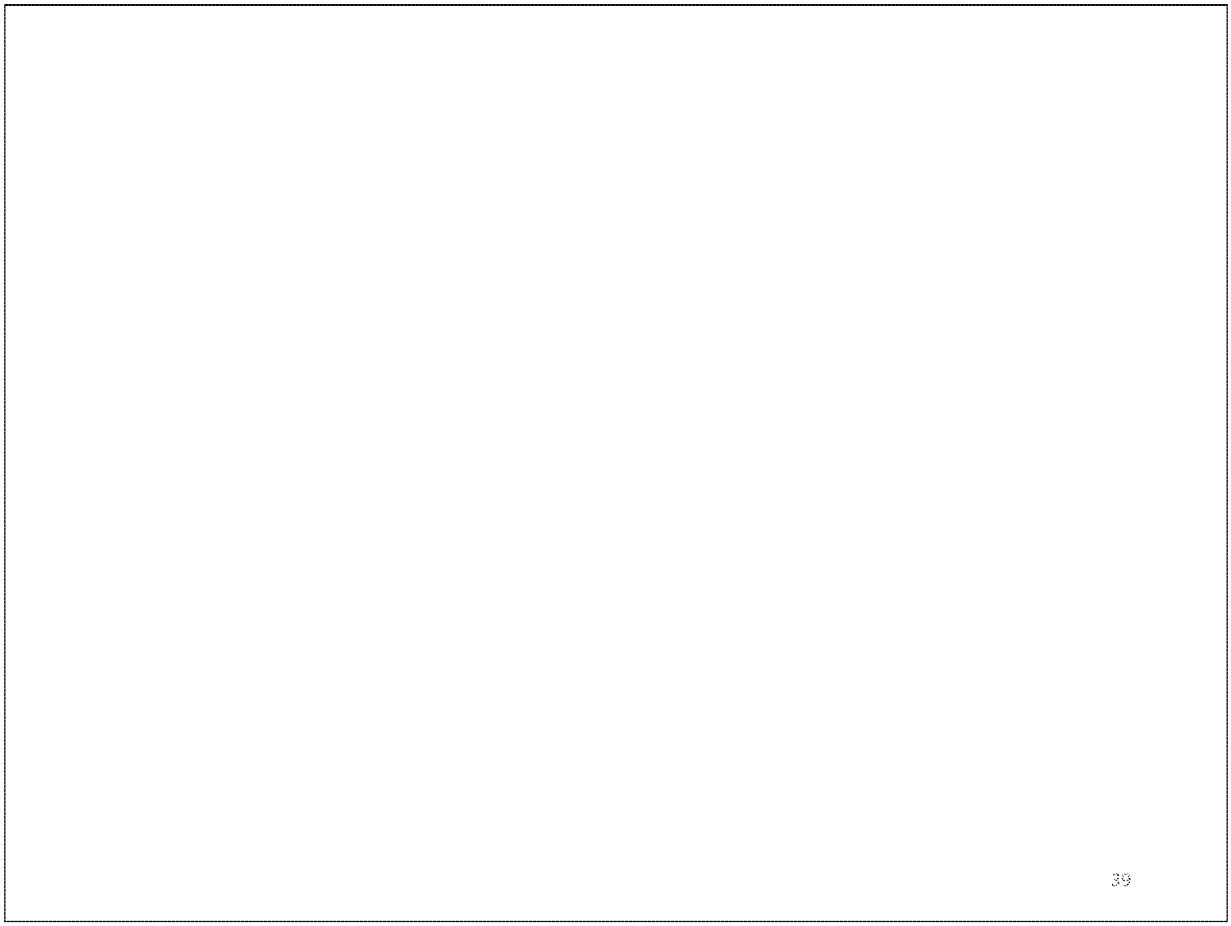

Have all three with lines that separate the three

Summary of PFAS water results

1. Wide range of GenX concentrations in wells
2. Found 10 PFAS besides GenX in more than half of wells
3. Legacy PFAS: PFBA and PFPeA detected frequently; PFOA and PFOS detected in some wells
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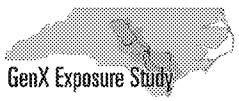
5. Overall, treated taps had lower levels of GenX than untreated taps



Say home filter not point-of-use filter

Important to know

>3000 private wells impacted by Fayetteville Works emissions identified to date

The 84 wells we sampled were not a random sampling of wells surrounding Fayetteville Works

Our data tell us about our study participants

May not be representative of all contaminated wells surrounding Fayetteville Works

Add spaces to the last paragraph

Summary of PFAS water results

1. Wide range of GenX concentrations in wells
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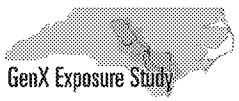
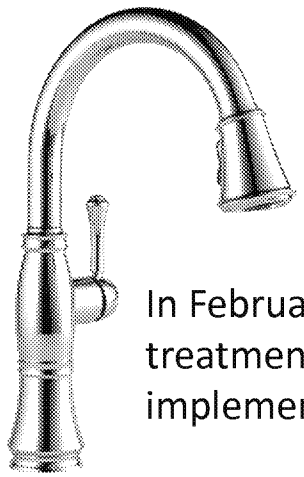


Say home filter not point-of-use filter

What did we find in taps?

Tap water sampling

Sampled *as is*



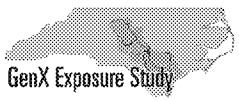
In February 2019, most treatments were homeowner implemented (not Chemours)

44

when the pilot ...testing of GAC was going on ... and that the consent decree was not yet finalized, so before formal intervention by Chemours
Tap interventions that we captured were mostly user implemented (not chemours implemented)

45 out of 82 homes had water treatment in February 2019

	Out of 82 homes
No treatment	32 (39%)
At least one type of treatment	45 (55%)
Public water	4 (5%)
Other water at the tap	1 (1%)



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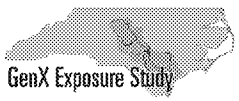
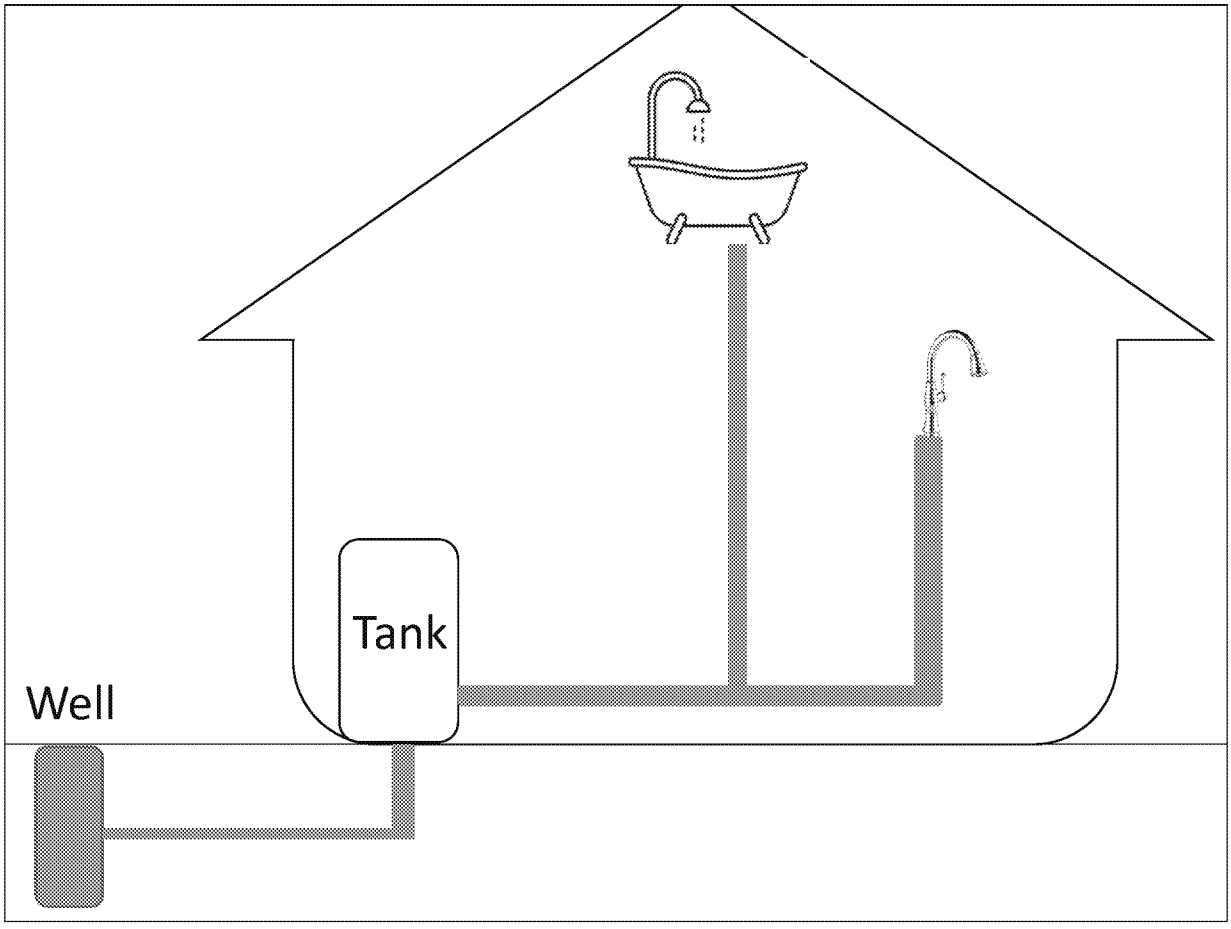
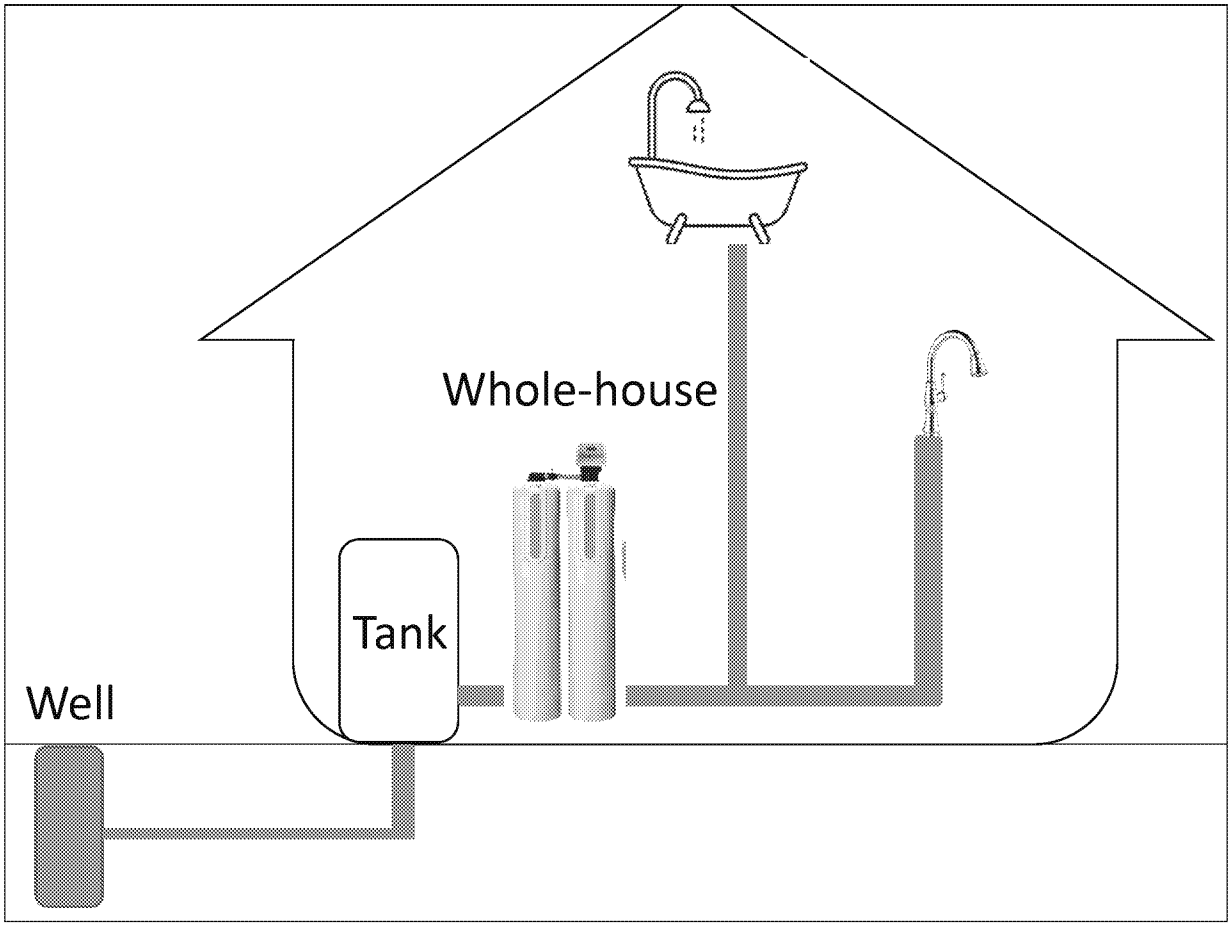
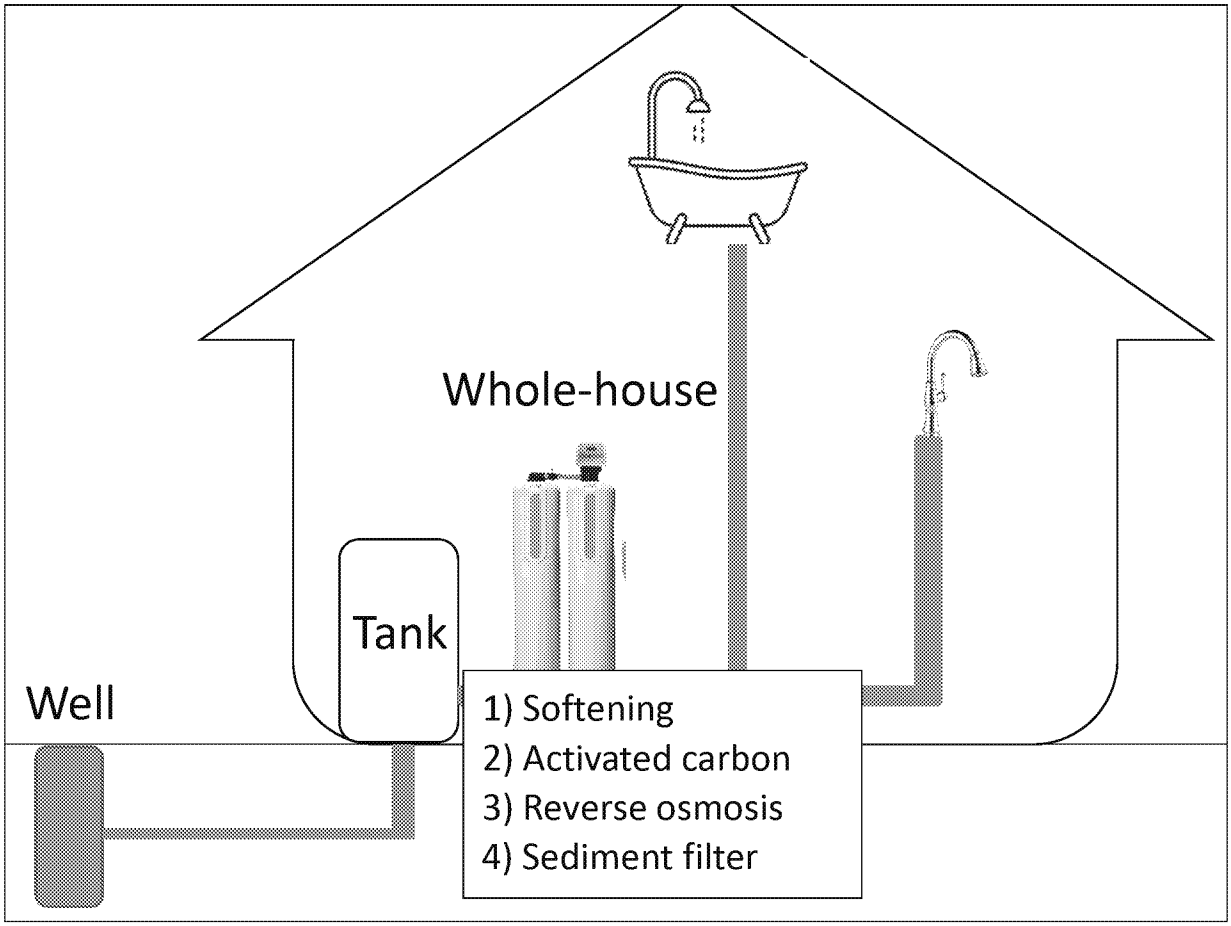


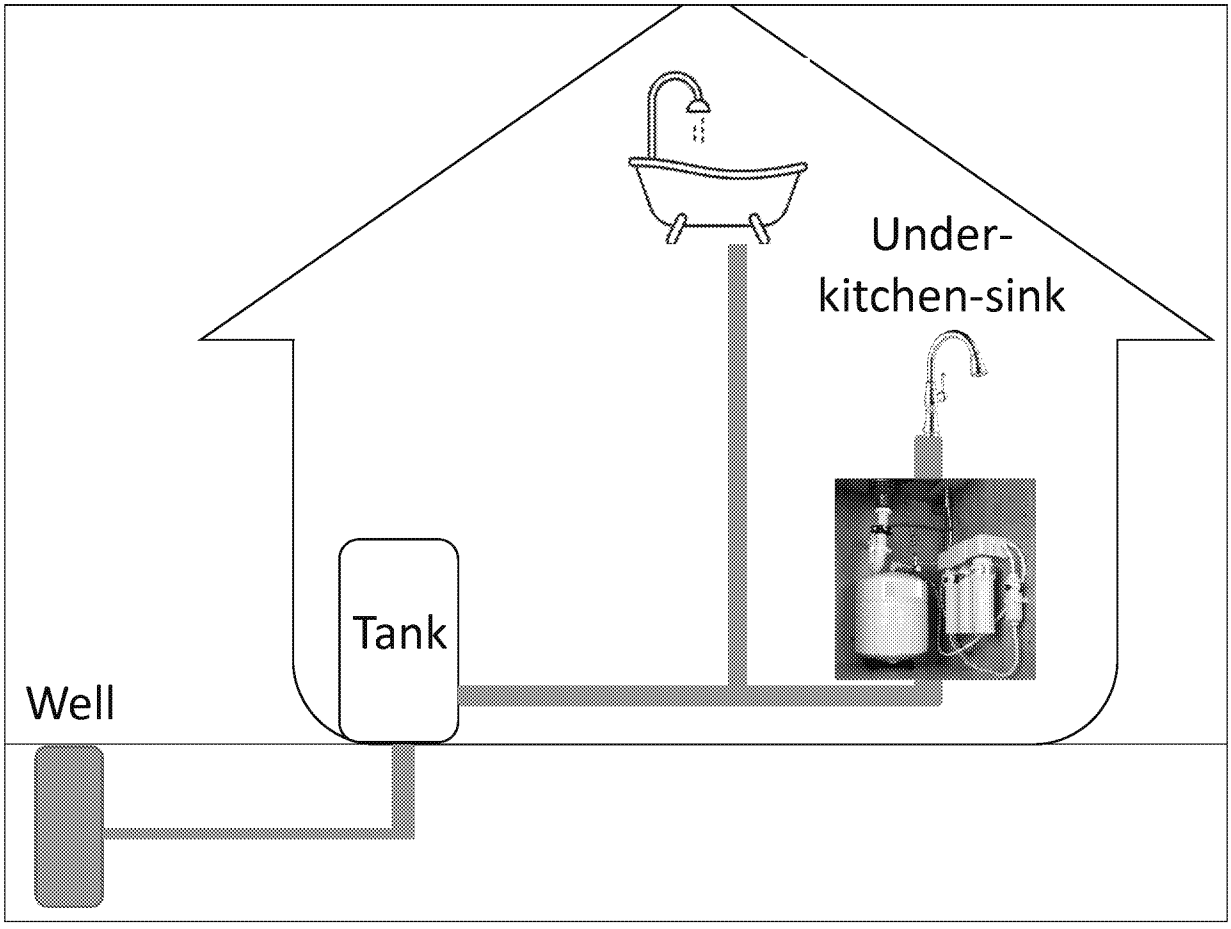

Tank
Well

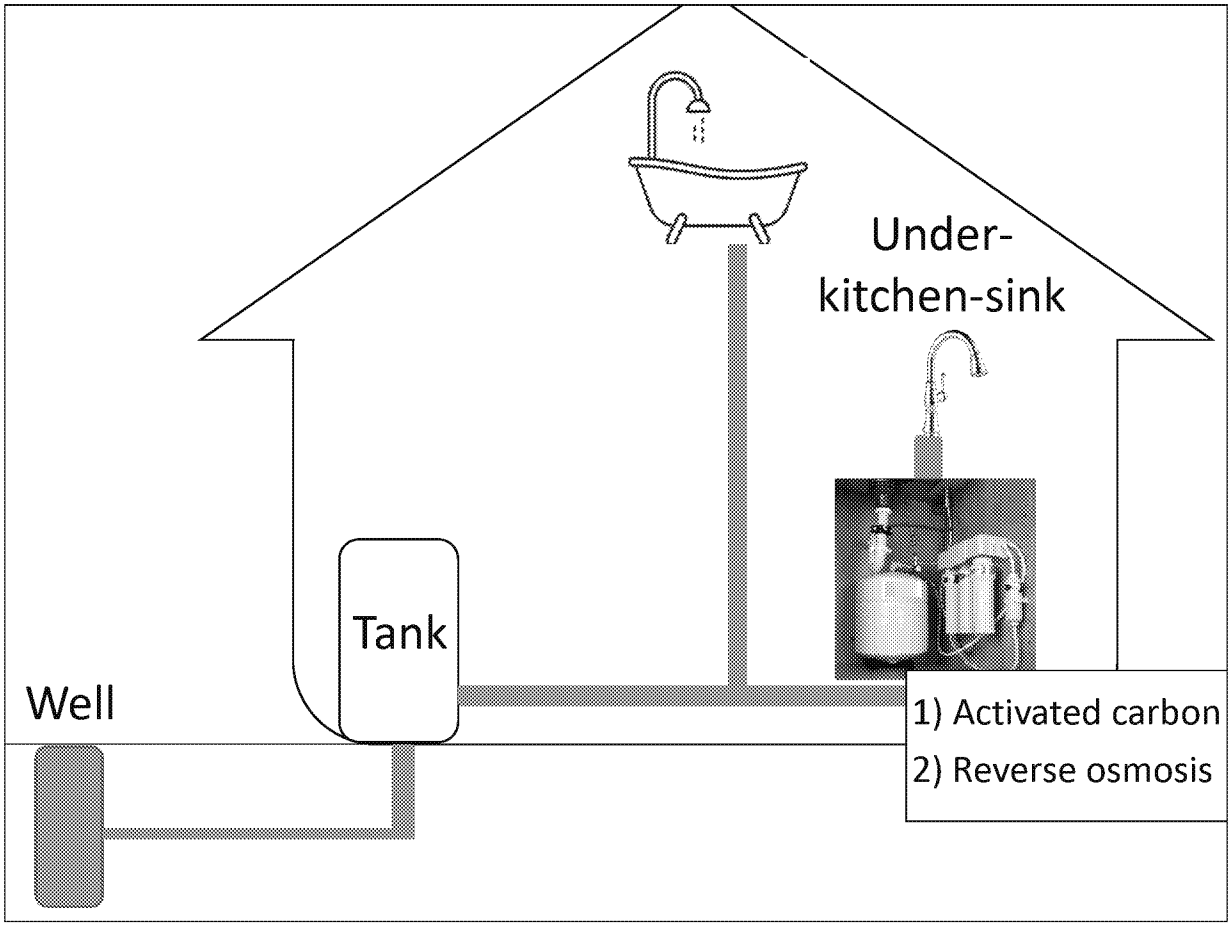


This picture shows a house with a well and pressure tank
Some of the homes we sampled had whole house water treatment which means that all of the water used for drinking, bathing was treated



Some homes had whole house water softening, whole house activated carbon, reverse osmosis or sediment filters


Under-
kitchen-sink
Tank
Well

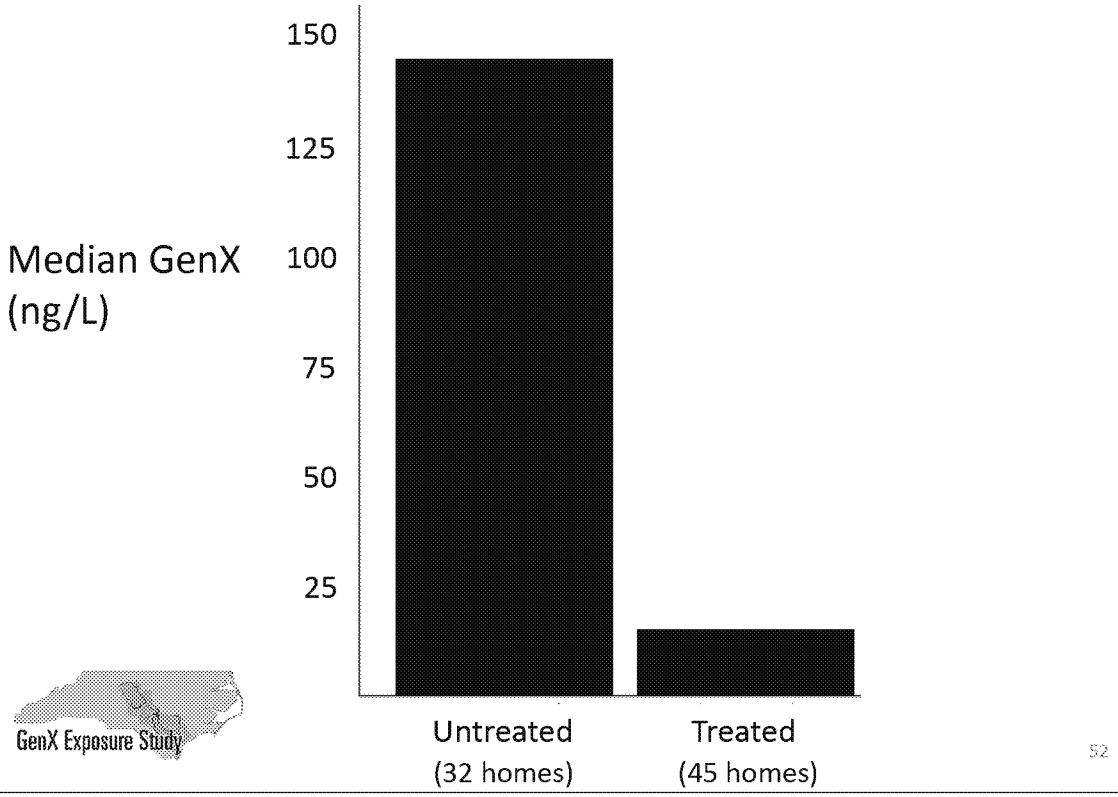


Some homes did not have a whole house system they had an under the kitchen sink system that only treated their drinking water
We saw some activated carbon and some reverse osmosis under the sink systems

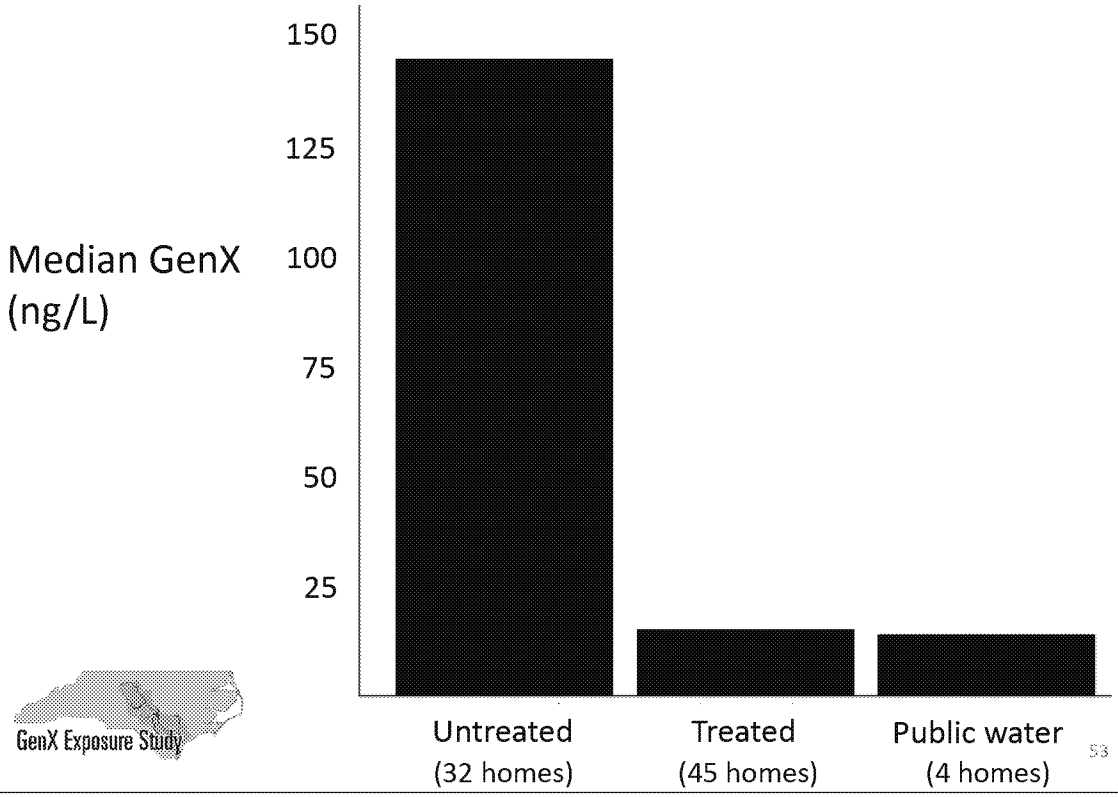
This is an example of a reverse osmosis system

We wrote down what people told us

Overall, treated taps had lower GenX

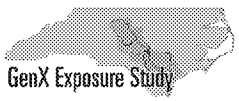


Overall, treated taps had lower GenX



Summary of PFAS water results

1. Wide range of GenX concentrations in wells
2. Found 10 PFAS besides GenX in more than half of wells
3. Legacy PFAS: PFBA and PFPeA detected frequently; PFOA and PFOS detected in some wells
4. Wells with higher GenX tended to have higher levels of the other PFAS
5. Overall, treated taps had lower levels of GenX than untreated taps



Say home filter not point-of-use filter

Chemours Consent Order

Requires Chemours to

1) Reduce air emissions, remove PFAS from wastewater before discharge, remove PFAS from contaminated groundwater

2) Provide filtration systems or public water for people with contaminated wells

Our study results do not qualify homeowners for Chemours provided treatment

Contact DEQ for additional well testing 919-707-8200

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What's next?

Analyze blood samples

- Waiting for labs to reopen to continue

Continue analysis of well and tap water

- Integrate results with those from Wilmington

Analyze urine and other samples

I say what's next

GenX Exposure Study will grow

Transition from an Exposure Study to a Health Study

Grow from 500 participants to 1000 participants

- 400 near Fayetteville
- 600 in New Hanover and Brunswick Counties

Increase Minority Recruitment

Five year study

- 2 blood collection events
- Measure PFAS
- Measure thyroid hormones

Superfund.ncsu.edu

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What should people do if they want to participate?

Acknowledgements

NC State

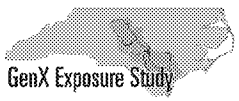
Jane Hoppin, PI
Detlef Knappe
Nadine Kotlarz
Katy May
Rob Smart
Zachary Hopkins
Claire Critchley

ECU

David Collier
Jamie DeWitt
Suzanne Lea

US EPA

Andrew Lindstrom
James McCord
Mark Strynar



New Hanover County Health Department

Phillip Tarte
Katelyn Matney

Cumberland County Health Department

Rod Jenkins
Adrian Jones
Jennifer Green

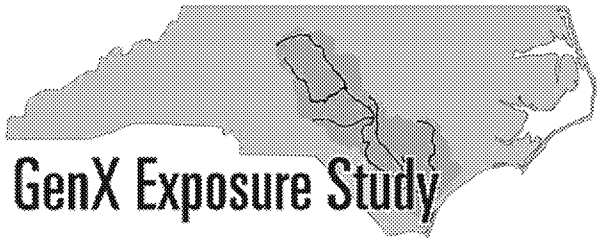
Cape Fear River Watch

Kemp Burdette
Madi Polera
Amanda Boomershine
Larry Cahoon
Deborah Maxwell

Sustainable Sandhills

Jon Parsons
Jonelle Kimborough

Thank you to study participants



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Funded by
NIEHS R21 ES029353
NC Policy Collaboratory
NC State Center for Human Health and the Environment
P30ES025128
NC State Superfund Center

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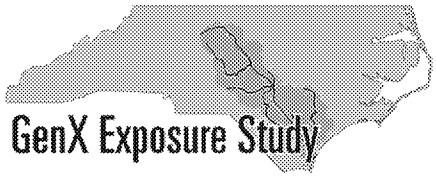

Virtual Fayetteville Community Meeting
June 20,2020

Thank you for joining us!

Keep up with the GenX Exposure Study at *GenXStudy.ncsu.edu*.

Follow the Center for Human Health and the Environment on Facebook *@NCStateCHHE*.

You can send any follow up questions or comments to *genx-exposure-study@ncsu.edu*.

Thanks to Marisa Incremona, Claire Critchley, Adrien Wilkie for their help behind-the-scenes

Chemours Consent Order, Feb 2019 Attachment C

1. GenX (HFPO-DA)
2. PFMOAA
3. PMPA
4. PFO2HxA
5. PEPA
6. PFO3OA
7. PFO4DA
8. Nafion byproduct 1
9. Nafion byproduct 2
10. PFECA G
11. PFO5DoA
12. PFHpA

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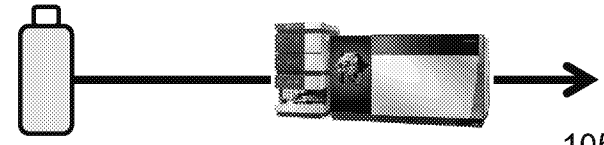
NVHOS, Nafion byproduct 4 not included

Chemours Consent Order, Feb 2019
Replacement Drinking Water

If…	Then…
GenX > 140 ng/L	Connect to public water OR Whole building filtration system
Total PFAS > 70 ng/L	Under sink reverse osmosis
1 PFAS > 10 ng/L	Under sink reverse osmosis

Venn diagram with Consent Decree criteria

PFAS measurements have uncertainty



Water sample containing 150 ng/L GenX

GenX concentration

105 – 195 ng/L GenX

100 ng/L
125 ng/L
140 ng/L
105 ng/L
165 ng/L
117 ng/L
191 ng/L

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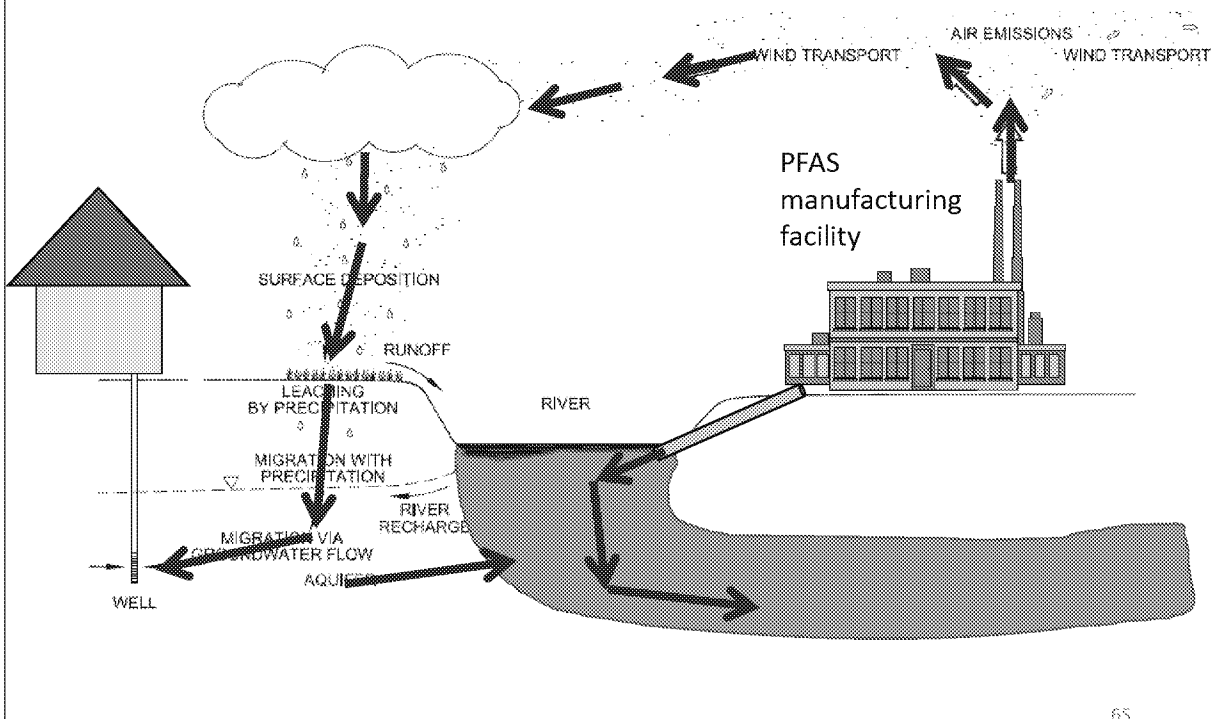
Cape Fear River Contamination



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Modified from Davis et al. *Chemosphere* 2007, 67, 2011–2019

Groundwater intrusion into the river